

UNIVERSITY OF CALIFORNIA

AGRICULTURAL EXPERIMENT STATION

E. W. HILGARD, DIRECTOR

CIRCULAR

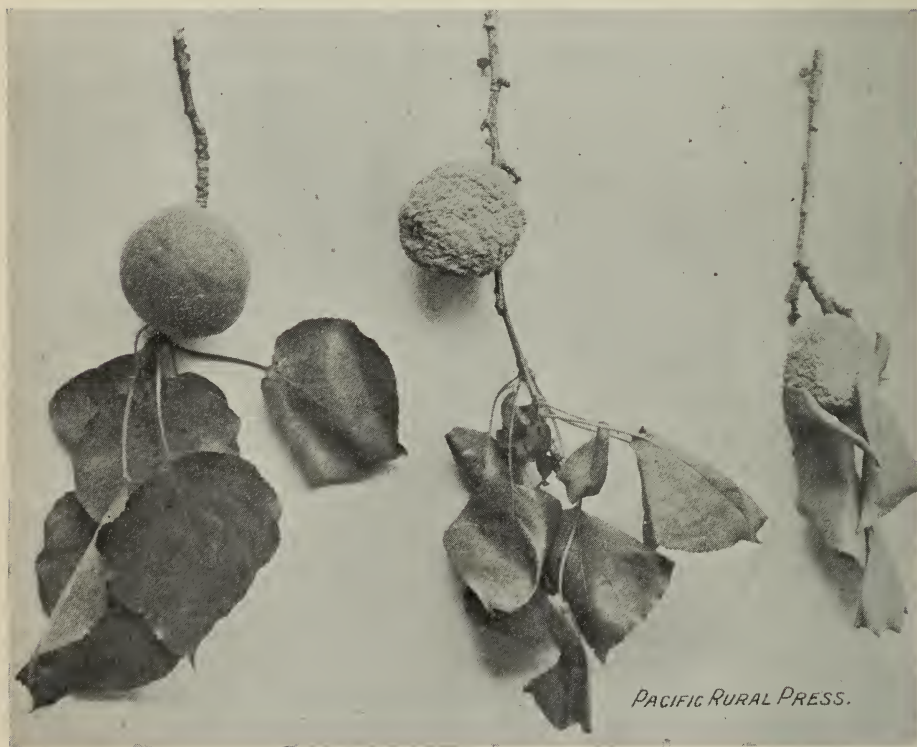
BROWN ROT OF STONE FRUITS.

By FREDERIC T. BIOLETTI.

Brown Rot is one of the most serious diseases with which fruit-growers have to contend. It attacks principally stone fruits—peaches, plums, apricots, and cherries, but occasionally does damage to apples, pears, and quinces. It is widely distributed throughout Europe and the United States. In some of the Eastern States it is considered the most destructive disease with which the peach-grower has to contend. In Delaware and Georgia it often destroys from 25% to 75% of the crop. It is reported to destroy more peaches and cherries in Michigan than all other diseases combined. In Kentucky it is said to be very destructive to apples, and in Oregon it has been the cause of very serious losses to the prune-growers for several seasons. In California, though its occurrence has been noted for several years, no serious damage seems to have been occasioned until last year, when it appeared abundantly in several localities. Statements were received from prune-growers in Napa County that 50% of the crop was rotting in some orchards, and specimens of the diseased fruit received by the Agricultural Station at Berkeley showed Brown Rot to be the cause. In several large orchards in Alameda County the late varieties of apricots were seriously affected; 25% or more of the crop being destroyed in some cases. All the cases of this disease which have so far been brought to the notice of the Station have been in localities not far from the sea and therefore more or less under the influence of the summer sea fogs. As there seems, however, to be a tendency of the disease to spread in California, and as recent experiments in Georgia and elsewhere show that it can be controlled with comparative ease, the following brief description of the disease and of the method of treatment is given.

Brown Rot is caused by a mould or fungus called *Monilia fructigena*, which attacks various parts of the plant, leaves, blossoms, twigs, and fruit. Its effects are most evident upon the fruit, but it does an amount of damage that is hard to estimate, by attacking the other

parts of the plant, but which some observers consider to be almost equal to that of the rotting of the fruit. The fruit is usually attacked after it has attained full size and just as it commences to soften. The first symptom in the case of apricots and peaches is a brown spot on one side of the fruit. This spot gradually enlarges and becomes covered with small ashy-gray pimples which consist of myriads of the spores of the fungus. Soon the whole fruit turns brown and the entire surface becomes covered with spores. The fungus then passes from the rotten fruit through its stem into the twig. Finally the disease attacks the twig so severely that it dries up, loses its leaves and dies. The accompanying illustration shows apricots and twigs in various stages of the disease, and the gradual progress from the fruit to the twigs is well shown. In the fruit on the left, by looking closely it



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EFFECT OF BROWN ROT ON FRUIT AND TWIGS OF APRICOTS.

can be seen that the lower side is darker-colored than the upper, and that the light-colored spores have commenced to appear. The middle specimen is covered with a layer of the pimple-like masses of spores, and the leaves have commenced to wither; while in the specimen on the right the leaves are quite dead and the fungus has passed into the

twig. The appearance of the disease on plums and prunes is somewhat different. In none of the specimens received at the station were the spores formed when they arrived. The appearance of the diseased plums was not at first very different from that of the normal ones, but when they were cut open the inside was found to be discolored. When placed in a moist warm place, however, the spore masses developed in one or two days, and then the appearance was very similar to that of the diseased apricots.

The attacked fruit, instead of becoming soft and falling off, as with most other rots, gradually dries up and often remains firmly attached to the tree until the following spring. In spring a new crop of spores is produced by the mummified fruit, and, in the case of peaches, the young growth and blossoms are attacked. The same probably occurs in the case of apricots and other fruits. One of the worst features of this disease is that the fungus may be in apparently healthy fruit. Peaches which when picked and packed showed no sign of the rot, may be completely spoiled when the boxes are opened two or three days later.

Treatment.—As the fungus passes the winter principally upon the mummified fruit, the most effective method of combatting the disease is to remove and destroy thoroughly all the diseased fruit. The diseased apricots should be gathered and destroyed as soon as the appearance of brown spots indicates that they are attacked, and not left on the tree until the fungus has penetrated the twigs. No fruit should be left on the surface of the ground. Any fruit which falls near the base of the trunk should be raked away in order that it may be buried by the plow. These measures alone, thoroughly applied, have been sufficient to produce a notable diminution in the amount of fruit attacked; but complete immunity can be obtained only by proper spraying in addition. All orchards where there is reason to suspect the presence of the rot, such as those where it appeared last year and those in their immediate neighborhood, should be sprayed with Bordeaux mixture one or two weeks before the blossoms open. This will prevent the infection of the blossoms, and in the case of peaches will also prevent curl-leaf. A winter wash with our ordinary lime-salt-sulphur mixture would doubtless be nearly as effective against the Brown Rot, and where used for destroying scale and other insects the first spraying with Bordeaux might be omitted. In any case, where the Brown Rot appeared last year the trees should be sprayed with Bordeaux as soon as the fruit has set. These measures will in most cases be sufficient with early fruit; but for late-ripening varieties, such as Moorpark apricots, a third spraying should be given about a week or ten days before the fruit commences to color. As Bordeaux would stain the fruit at this time it is better to use a spray of copper acetate.

Bordeaux mixture is a fungicide consisting of bluestone (copper sulfate), lime and water, mixed in various proportions according to the season and to the kind of tree to be sprayed. For the first spraying, before the buds have started, the following formula can be recommended:

Copper sulfate.....	5 pounds
Quicklime	5 pounds
Water.....	45 gallons

For spraying the trees when in leaf it is better to use less sulfate and more lime, especially on peaches, in order to avoid danger of injuring the foliage. For the second and any of the subsequent sprayings the following should be used:

Copper sulfate.....	3 pounds
Quicklime	6 pounds
Water.....	45 gallons

Directions for mixing.—1. Suspend the copper sulfate in a basket or perforated wooden box, in a barrel containing half the water. The box containing the sulfate should be just below the surface of the water in order to dissolve quickly.

2. Slake the quicklime slowly and with great care to insure a perfectly smooth paste free from grit. After the paste has stood for twenty to forty minutes, with enough water to ensure it from drying, dilute with the remainder of the water and strain through a wire sieve.

3. When the sulfate is dissolved and the milk of lime quite cool, stir each mixture well and pour them together into a suitable receptacle.

If large quantities of Bordeaux are needed it is more convenient to make up two stock solutions as follows:

- A.*—Copper sulfate, 50 pounds; Water, 25 gallons.
B.—Quicklime, 50 pounds; Water, 25 gallons.

These should be made up in the way already described and separated until needed. For use take half a gallon of solution *A* for every pound of copper sulfate, and half a gallon of mixture *B* for every pound of lime wanted; dilute each separately with a little less than half the water; pour together and make up to the required volume with water, stirring thoroughly. Never mix the lime and copper liquids when hot.

The spray should be made as short a time as possible before using and should be applied when the trees are dry and the weather calm. Only the best quality of quicklime should be used. The spray for use when the fruit is large is made by mixing six ounces of Copper Acetate (dibasic acetate of copper) with forty-five gallons of water. When the acetate is quite dissolved and mixed with the water it is ready to be applied.